Attachment E

Computation Sheet for Determining Run-on Discharges

INSTRUCTIONS

- **Item A**. The runoff coefficient represents the percent of water, which will run off the ground surface during the storm. Values of the coefficient, "C", can be determined from Figure 819.2A, "Runoff Coefficients for Undeveloped Areas", and Table 819.2B, "Runoff Coefficients for Developed Areas", from Caltrans, Highway Design Manual, Fifth Edition, provided with this Attachment.

- Refer to the Caltrans Highway Design Manual, Topic 819 – Estimating Design Discharge, for a more detailed explanation on calculating weighted runoff coefficients for areas containing varying amounts of different cover.

- **Item B**. Rainfall intensity, in millimeters per hour, is the average rainfall intensity for the selected frequency. Refer to the County Flood Control, or U. S. Army Corps of Engineers manuals for rainfall intensity values.

- **Item C**. Drainage area in square kilometers includes impervious and pervious areas and surfaces covered by buildings.

- SWPPP preparer shall provide calculations for offsite run-on if flow quantities are not available via the project design documents (Drainage Report, Hydrology Report, etc.)

- The rational method should not be used for drainage areas greater than 1.3 km^2 (130 ha). See Caltrans, Highway Design Manual, Fifth Edition, Section 819.2.

Existing Site Conditions

$$\text{Area Runoff Coefficient} \quad = \quad \underline{\hspace{3cm}} \quad \text{(A)}$$

$$\text{Area Rainfall Intensity} \quad = \quad \underline{\hspace{2cm}} \text{mm/hr} \quad \text{(B)}$$

$$\text{Drainage Area} \quad = \quad \underline{\hspace{2cm}} \text{km}^2 \quad \text{(C)}$$

$$\text{Site Area Run-on Discharge} \quad 0.28\text{x (A) x (B) x (C)} \quad = \quad \underline{\hspace{2cm}} \text{m}^3\text{/sec} \quad \text{(D)}$$

Figure 819.2A

Runoff Coefficients for Undeveloped Areas
Watershed Types

	Extreme	**High**	**Normal**	**Low**
Relief	**.28 -.35** Steep, rugged terrain with average slopes above 30%	**.20 -.28** Hilly, with average slopes of 10 to 30%	**.14 -.20** Rolling, with average slopes of 5 to 10%	**.08 -.14** Relatively flat land, with average slopes of 0 to 5%
Soil Infiltration	**.12 -.16** No effective soil cover, either rock or thin soil mantle of negligible infiltration capacity	**.08 -.12** Slow to take up water, clay or shallow loam soils of low infiltration capacity, imperfectly or poorly drained	**.06 -.08** Normal; well drained light or medium textured soils, sandy loams, silt and silt loams	**.04 -.06** High; deep sand or other soil that takes up water readily, very light well drained soils
Vegetal Cover	**.12 -.16** No effective plant cover, bare or very sparse cover	**.08 -.12** Poor to fair; clean cultivation crops, or poor natural cover, less than 20% of drainage area over good cover	**.06 -.08** Fair to good; about 50% of area in good grassland or wood-land, not more than 50% of area in cultivated crops	**.04 -.06** Good to excellent; about 90% of drainage area in good grassland, woodland or equivalent cover.
Surface Storage	**.10 -.12** Negligible surface depression few and shallow; drainageways steep and small, no marshes	**.08 -.10** Low; well defined system of small drainageways; no ponds or marshes	**.06 -.08** Normal; considerable surface depression storage; lakes and pond marshes	**.04 -.06** High; surface storage, high; drainage system not sharply defined; large flood plain storage or large number of ponds or marshes.

Given   An undeveloped watershed consisting of;

     1) rolling terrain with average slopes of 5%,
     2) clay type soils,
     3) good grassland area, and
     4) normal surface depressions.

Solution:

Relief	0.14
Soil Infiltration	0.08
Vegetal Cover	0.04
Surface Storage	<u>0.06</u>
C=	0.32

Find   The runoff coefficient, C, for the above watershed.

Table 819.2B

Runoff Coefficients for Developed Areas

Type of Drainage Area	Runoff Coefficient
Business:	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries:	0.10 - 0.25
Playgrounds:	0.20 - 0.40
Railroad yard areas:	0.20 - 0.40
Unimproved areas:	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2-7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2-7%	0.18 - 0.25
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs:	0.75 - 0.95

Attachment E *-Example*

Computational Sheet for Determining Run-on Discharges
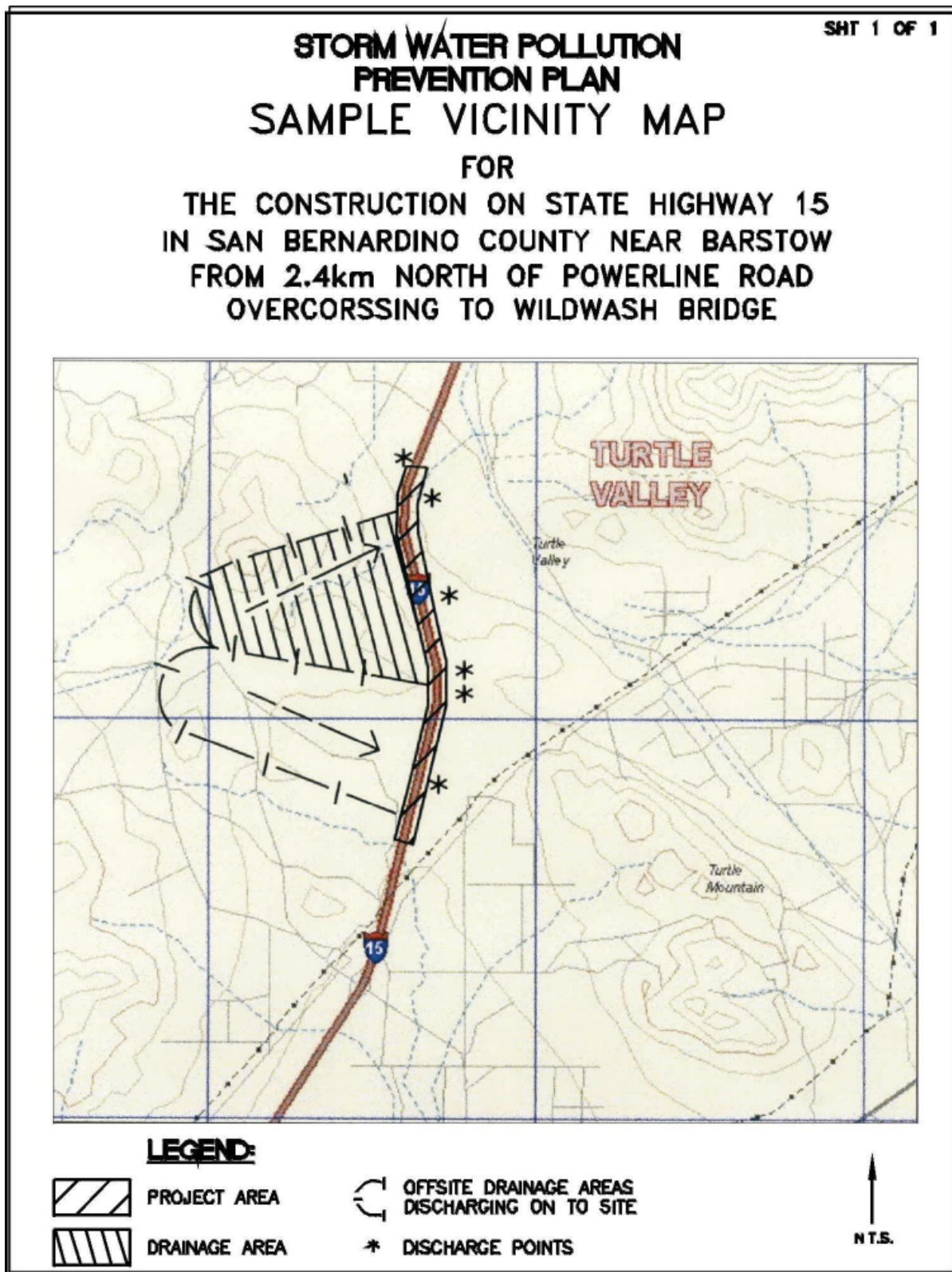
Existing Site Conditions

$$\text{Area Runoff Coefficient}^1 = \underline{\hspace{2cm} 0.32 \hspace{1cm}} \quad (A)$$

$$\text{Area Rainfall Intensity}^2 = \underline{\hspace{0.5cm} 12.7 \text{ mm/hr} \hspace{0.5cm}} \quad (B)$$

$$\text{Drainage Area}^3 = \underline{\hspace{0.8cm} 0.71 \text{ km}^2 \hspace{0.8cm}} \quad (C)$$

$$\text{Site Area Run-on Discharge} \quad 0.28\text{x}(A)\text{x}(B)\text{x}(C) = \underline{\hspace{0.5cm} 0.81 \text{ m}^3/\text{sec} \hspace{0.5cm}} \quad (D)$$

1. The runoff coefficient represents the percent of water, which will run off the ground surface during the storm for the area depicted on page 7. The value for the runoff coefficient, .32, was determined from Figure 819.2A, page 5, based on the site characteristics (terrain, type of soil, vegetation, etc.) for an undeveloped area.

2. Rainfall intensity, in millimeters per hour, is the average rainfall intensity for the selected frequency and duration (2 year, 1 hour storm). The Rainfall Depth versus Return Period chart, page 7, from the San Bernardino County Flood Control Hydrology Manual gives a value of 0.5 in/hr (12.7 mm/hr) for the site area.

3. Drainage area, in square kilometers, depicted on page 5 is 0.71 km^2.

STORM WATER POLLUTION
PREVENTION PLAN
SAMPLE VICINITY MAP
FOR
THE CONSTRUCTION ON STATE HIGHWAY 15
IN SAN BERNARDINO COUNTY NEAR BARSTOW
FROM 2.4km NORTH OF POWERLINE ROAD
OVERCORSSING TO WILDWASH BRIDGE

SHT 1 OF 1

LEGEND:

PROJECT AREA

DRAINAGE AREA

OFFSITE DRAINAGE AREAS
DISCHARGING ON TO SITE

* DISCHARGE POINTS

N.T.S.

Q:\52907\CDM\ VicinityMap(8.5x11).dwg   09/12/00 16:38
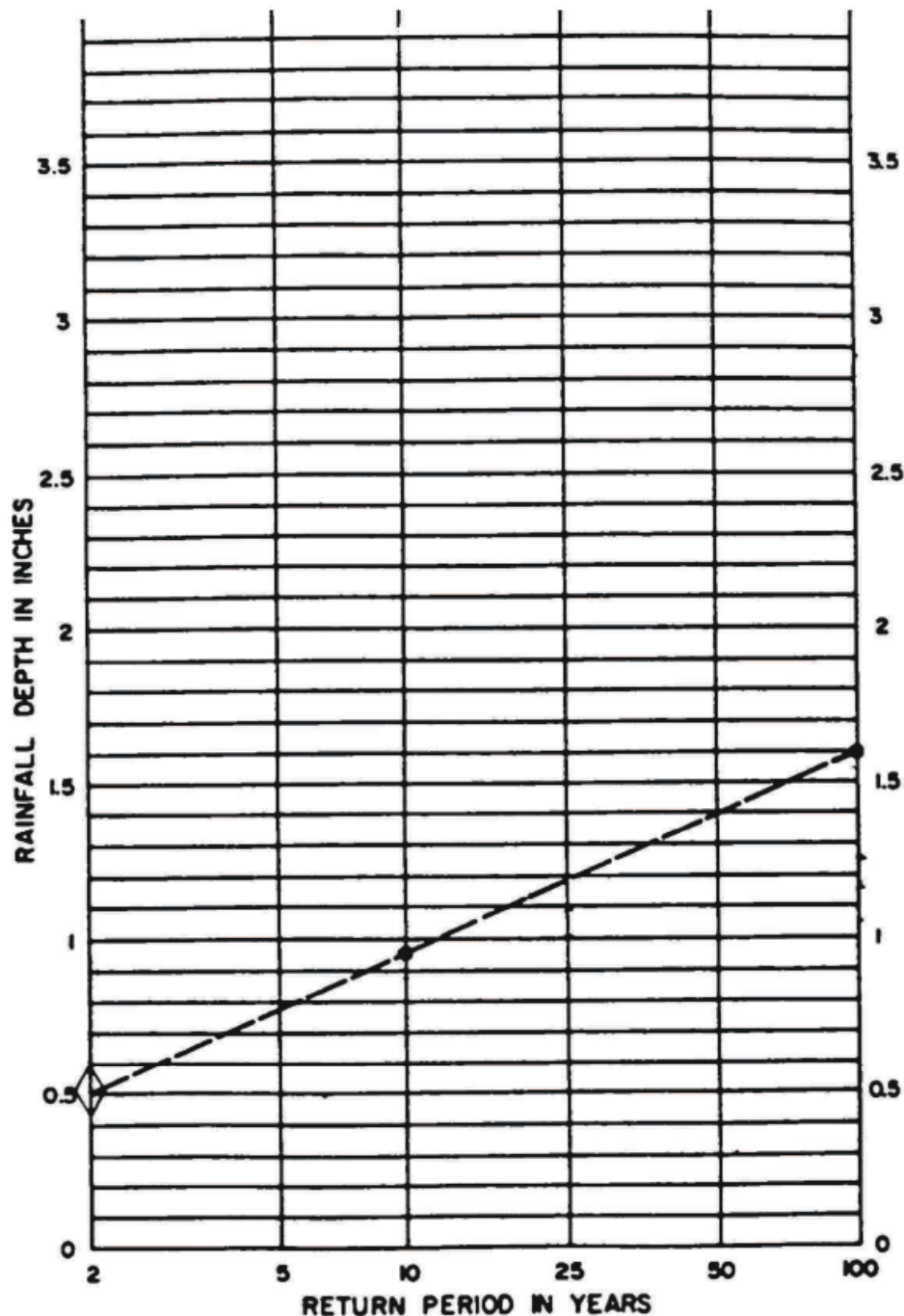
NOTE:
I FOR INTERMEDIATE RETURN PERIODS PLOT 10-YEAR AND 100-YERAR ONE HOUR VALUES FROM MAPS, THEN CONNECT POINTS AND READ VALUE FOR DESIRED RETURN PERIOD. FOR EXAMPLE GIVEN 10-YEAR ONE HOUR = 0.95" AND 100-YEAR ONE HOUR = 1.60", 2-YEAR ONE HOUR = 0.5".

REFERENCE NOAA ATLAS 2, VOLUME II-CAL., 1973

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS
RETURN PERIOD FOR
PARTIAL DURATION SERIES